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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/682,275	10/08/2003	Daniel J. Zierath	42P15929	9333

8791 7590 12/28/2007

BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE, CA 94085-4040

EXAMINER	
LEADER, WILLIAM T	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
12/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/682,275	ZIERATH ET AL.	
	Examiner	Art Unit	
	William T. Leader	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7 and 9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 7 and 9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 9, 2007, has been entered.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

3. Claims 1-5, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reid et al (US 2001/0015321) in view of the Lowenheim text *Electroplating*, Basol (6,921,551) and Mayer et and (6,946,065) for the reasons of record and in view of the following comments.

4. As indicated in the previous actions, the Reid et al patent is directed to a method of electrodepositing copper onto a semiconductor substrate from a copper plating bath containing a suppressor, chloride ions, a leveler, and an accelerator

ions in a manner in which defects in metal features are avoided. Reid et al discloses the steps of determining the concentration of the suppressor additive, determining the concentration of the chloride ions, determining the concentration of the leveler, and determining the concentration of the accelerator. Reid discloses that the concentration of the suppressor is on the order of from 100 to 2000 mg/l (paragraph [0019] or 1-6 mg/l (Table 1); the concentration of chloride my be 20-200 mg/l (Table 1); the concentration of the leveler may be between 1 and 30 mg/l ([paragraph 0020]) or 0.5-8 mg/l (Table 1); and the concentration of the accelerator may be 0.5-8 mg/l (Table 1). The ranges overlap those disclosed and claimed by applicant. Reid et al show in figure 2 that it is known to evaluate the number of defects with respect to the composition of the electroplating bath.

5. Lowenheim teaches that chloride must be present for proper action of the addition agents (page 202). The Basol patent is directed to electroplating a metal such as copper onto a semiconductor workpiece. Basol teaches that the plating bath may contain additives such as a suppressor and an accelerator, and that chloride is known to interact with these additives, affecting the performance of suppressing and accelerating species (column 11, lines 35-43).

6. The Mayer et al patent is similarly directed to the deposition of copper onto a semiconductor workpiece. Mayer et al disclose the use of a copper plating bath which contains additives of three general types: suppressor additives, accelerator

additives and levelers. See column 8, lines 19-61. Mayer et al teach that the additives interact with each other (column 17, lines 7-8).

7. The prior art of record is indicative of the level of skill of one of ordinary skill in the art. It would have been obvious at the time the invention was made to have determined the concentration of the additives in the process of Reid et al so that the concentration of chloride is determined so as to catalyze the suppressor as taught by Lowenheim after the concentration of suppressor is determined, to have determined the concentration of leveler after determining the concentration of the suppressor, and to have determined the concentration of the accelerator based on the chloride concentration and the suppressor concentrations because it is known that additives interact with each other as taught by Basol and Mayer et al suggesting that the concentrations needed to achieve the benefits of the additives are interdependent.

8. At page 5 of the Remarks, applicant argues that the combined teachings of the cited references do not suggest the method as presently claimed. This argument is not persuasive. Basol teaches that chloride interacts with the accelerator and suppressor additives, while Mayer teaches that there is evidence for the interaction between the organic additive species. Thus, in view of the cited references, one would conclude that the interaction between the various additives is mutual. That is, for example, the chloride interacts with the accelerator and the accelerator interacts with the chloride. The leveler interacts with the accelerator and the

accelerator interacts with the leveler, and so on. Because of this interaction, it would have been obvious to have based the determination of the concentration of any one of the additives on the concentration of the other additives. No unexpected results are seen in determining the concentration of the suppressor prior to determining the concentration of the chloride, leveler and accelerator as now recited.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William T. Leader whose telephone number is 571-272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D. Wilkins, III/
Harry D. Wilkins, III
Primary Examiner
Art Unit 1795

WL
William Leader
December 20, 2007